DREDGE/EXCAVATION, HAUL BARGE TRANSPORT, AND DEWATER PLAN

JORGENSEN FORGE EARLY ACTION AREA

Earle M. Jorgensen Company Property
Seattle, WA

Prepared for:

ANCHOR QEA

720 Olive Way, Suite 1900
Seattle, WA 98101

Prepared by:

Pacific Pile&Marine

700 S. Riverside Dr.
Seattle, WA 98108

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1.0 Purpose & Objective

The purpose of the Dredging/Excavation, Haul Barge Transport, and Dewater Plan (Dredge Plan) is to detail the means and methods to perform dredging and excavation activities, and associated haul barge transport and material dewatering, during construction of the Jorgensen Forge Early Action Area Cleanup. The objectives of the Dredge Plan include providing detail on the following items during dredging and excavation:

- The equipment that will be utilized for dredging and excavation activities
- Means and methods for dredging and excavating impacted sediment and soil, and associated haul barge transport and material dewatering
- Work sequence
- Means and methods for managing the stockpile area
- Means and methods to position dredge
- Progress survey planning
- Means and methods for debris removal
- Contractor Quality Control

2.0 Work Sequence and Equipment

2.1 Work Sequence

Dredging is in-water removal that is completed using water-based equipment and excavation is removal that is completed "in-the-dry" using upland-based equipment. Dredging and excavation activities will be performed from upstream (south end of Jorgensen Forge shoreline) to downstream (north end of Jorgensen Forge shoreline). Excavations within the Jorgensen Forge Outfall Site (JFOS) containment barrier wall (referred to as a cofferdam) and shoreline bank excavation above elevations +2 to +4 feet MLLW will be performed ahead of in water dredging. This will minimize slope stability issues that may occur if sediments at lower elevations are removed prior to shoreline bank soils at higher elevations. Excavation and dredging activities will be considered complete within an excavation area or dredge management unit (DMU) following survey review and the Owner's Project Engineer's approval. The overall detailed work sequence would be as follows:

1. Mobilize upland equipment for excavation activities, install best management practices (BMPs) on the upland area of the Jorgensen Forge property, setup stockpiling and load-out areas, and dewatering and water treatment system.
2. Install containment booms at perimeter of work zone.
3. Perform debris removal on the shoreline bank, including timber pilings, slag, concrete, and miscellaneous debris.

4. Excavate shoreline bank that is to be removed from above a +2.0 to +4.0 MLLW

depending on tide cycles and nature of materials encountered. Work would progress from the south end of the Jorgensen Forge property at sheet pile wall towards the cofferdamn, as shown in the Construction Drawings. Excavation of shoreline materials within the intertidal zone (below approximately +12 feet MLLW) would be timed to coincide with the daily lower low tide cycle. All excavations performed prior to July 20 (the start of the in-water construction window) would be "in-the-dry" in accordance with the Construction Specifications.

5. Concurrent with shoreline bank excavation, mobilize barge, dewatering equipment, water treatment equipment, and in-water support equipment for excavation within the cofferdam.
6. Excavate all non-Toxic Substances Control Act (TSCA) materials within the cofferdam followed by water treatment, haul barge transport, transloading and transporation to the landfill. Survey data will be submitted to the Owner's Project Engineer for approval to verify removal elevations were achieved.
7. Excavate all underlying TSCA materials within the cofferdam followed by water treatment, haul barge transport, transloading and transporation to the landfill. Survey data will be submitted to the Owner's Project Engineer for approval to verify removal elevations were achieved. Once approved, the Owner's representatives will collect any required post-dredge, pre-backfill samples within cofferdam. The water surface elevations within the cofferdam will be maintained at elevation +11 feet MLLW 24/7 during period of cofferdam excavation and backfill.
8. Following sampling, interim backfill will be placed inside the cofferdam from 6"-24" above the final excavation cut elevation.Upon achieving final subgrade elevations at a shoreline excavation area, the soil will be compacted down using the back of the excavator bucket to minimize slope erosion until shoreline containment placement is performed.
9. Perform a final survey of all shoreline bank areas that will be excavated from the top of bank. In general, this will be performed with real-time kinematic – global positioning system (RTK-GPS) using upland surveying equipment but lower elevations may be bathymetrically surveyed during high tide using in-water equipment.
10. Relocate dredging equipment, dewatering equipment, water treatment equipment, and in-water support equipment to southern portion of dredge area to initiate in-water dreding activities.
11. Dredge sediment to be removed approximately below a +4.0 to +2.0 feet MLLW from the south end of Jorgensen Forge property at sheet pile wall to the north boundary of dredging extents shown in the Construction Drawings.
12. Dredging will proceed downstream and from higher elevations (shallow) to lower (deeper) elevations. A detailed discussion of the dredge sequence is included in Section 4.0.
13. Perform bathymetric surveys for completed DMUs and receive approval for interim backfill material placement from the Owner's Project Engineer. Begin interim backfilling. Backfilling sequence is discussed in further detail in the Backfill Plan, Appendix J of the RAWP.

14. Perform all final bathymetric surveys following completion of dredging and receive approval for final backfilling any remaining areas from the Owner's Project Engineer.
15. Demobilize dredging equipment, dewatering equipment, water treatment equipment, and all in-water support equipment that will not be utilized for backfilling operations.

2.2 Equipment

Dredge Barge

The dredge barge is the "Web", a spud barge owned by Pacific Pile & Marine (PPM). The Web Barge is 142-foot long by 50-foot wide with a 12-foot deep scow. It is outfitted with two heavy-duty spuds for anchoring and stability once it is in the desired location. The spuds on the Web are 90 feet long allowing it to anchor itself in 60+ feet of water. The barge will be equipped with heading sensor in order to track its position in the GPS.

Contaminated Sediment Barge

Contaminated sediment barges used for the dredge spoils will consist of two identical barges each 180-foot long by 50-foot wide by 12-foot deep. The barges are equipped with concrete wear decks and 4-foot high steel fences around the perimeter that will be sealed to capture all dredge water for collection and treatment avoiding an overflow situation. The barges are capable of holding approximately 2,000 tons of material. Approximately 1,000 tons of material will be generated each shift before the barge is offloaded. This will give the barge 6'-4" of freeboard to top of barge deck. Material will be stacked in such a way as to ensure that material cannot be lost from the barge during transport. At present, the current barges planned for use are named the "KP-1" and "KP-2".

Hitachi 1200 Excavator

A 1200 Hitachi Excavator will be used to perform the dredging. The 1200 was built in 2006 and is rated to lift 6 tons. It will be outfitted with 30' dredge arm and is powered by a Cummins QSK23 478 diesel engine. The hydraulic system on the excavator uses environmentally friendly vegetable oil in place of petroleum-based oil. To facilitate precise spatial tracking, the excavator will be equipped with inclinometers on the boom, stick and bucket, as well as heading sensors on the body of the excavator. The inclinometers will be used in conjunction with a RTK GPS system that uses Hypack's Dredgepack software to facilitate positioning within the dredge prism. A closed environmental Young bucket will both be used to capture approximately 3.5 cubic yards per cycle and will have sharpened steel teeth mounted to the digging edge of the bucket. As the bucket is closed, the material is compressed helping to reduce the amount of water contained in the dredged sediment. PPM owns a large selection of Jewell and Young buckets that may be used if site conditions warrant it. If the Young bucket cannot effectively remove the encountered materials, PPM will seek approval

from the Owner's Project Engineer to use a more effective digging bucket prior to changing the bucket type.

Hitachi 470 Excavator

A 470 Hitachi excavator equipped with a long-reach arm with a 4 cubic yard re-handle bucket will be used to place and grade filter, armor, and habitat substrate material from approximately a +2.0 to +4.0 feet MLLW elevation and above. The 470 will be a rented excavator so it is unknown whether it will be equipped with environmental friendly hydraulic oil. PPM will request that the excavator be equipped with this type of oil, if possible.

Hitachi 450 Excavator

A 450 Hitachi excavator will be used to assist in shoreline bank excavations. The 450 was built in 2007. It will be outfitted with 17' dredge arm and is powered by a 314 horsepower diesel engine. The hydraulic system on the excavator uses environmentally friendly vegetable oil in place of petroleum-based oil. The excavator will be equipped with inclinometers on the boom, stick and bucket. The excavator will also use RTK GPS for positioning. A standard bucket equipped with a thumb will be used on the excavator. This excavator will only perform excavation operations in-the-dry due to the use of the open digging bucket.

Hitachi 270 Excavator

A Hitachi 270 excavator will be used to export the excavated shoreline soils into truck and trailers for transport and disposal at permitted offsite disposal facility. The 270 was built in 2008. It will be outfitted with 17' dredge arm and is powered by a 314 horsepower diesel engine. The hydraulic system on the excavator uses environmentally friendly vegetable oil in place of petroleum-based oil. A standard bucket equipped with a thumb will be used on the excavator. Due to the 270 excavator only be used to transload material into trucks, a RTK GPS system will not be used.

Water Treatment System

The water treatment system will be provided by PPM's subcontractor WaterTectonics. The water treatment system will consist of a primary and secondary treatment system. The primary system will consist of approximately four detention tanks that allow for sediment to settle out from the water. The secondary treatment system consist of chitosan sand filtration system that injects chitosan acetate to remove soil particles and then the water travels through a water quality monitoring valve to verify the water has meet the discharge specifications before final discharge into the waterway. In the Schedule A area where water is in contact with TSCA level material, the water will be run through carbon filters for polishing before final discharge into the waterway per the Dewatering Plan in Appendix G.

Sonja H. Tugboat

The Sonja H. tugboat will be used to transport the barges to and from PPM's main yard located at 700 S. Riverside in Seattle, Washington. The Sonja H. is a 500 horsepower tug that is 63' long, 22' wide by 7.5' deep.

Fog Dog Survey Boat

The Fog Dog survey boat will be used to perform the bathymetric surveying. It is a 27' Almar Aluminum hulled jet drive, powered by a Cummins diesel engine. The survey equipment consists of a Reson SeaBat 7125 multibeam head and processor, with positioning provided by an Applanix POS MV RTK GPS system. The Multibeam head is mounted on the starboard side and pivots up and out of the water for travel/transport. The vessel has dual displays for the operator and survey tech, inverter, extra-large battery bank and auxiliary generator for ample power capacity. It also has on board cellular internet access and wifi connectivity so that surveys or troubleshooting can be done remotely.

Disposal Truck and Trailers

Truck and trailers capable of holding approximately 30 tons of soil will be used to export the excavated shoreline bank soils. The beds of the truck and trailers will be lined with 6-mil poly sheeting and inspected for leaks prior to leaving. The truck and trailers will be supplied by Waste Management.

2.3 Hours of Operation

In-water dredging operations will occur during high-tide windows. This time will vary day to day due to the consistently shifting times of high tides. Dredging will occur on one shift during the high-tide window. The shift will be for 12 hours. During periods of semi-diurnal tides a second 12-hour shift may be used to accelerate the schedule, if needed.

Shoreline excavation operations will occur during low-tide windows. This time will vary day to day due to the consistently shifting times of low tides. Excavations will occur on one shift during the low-tide window. The shift will be for 10 hours. During periods of semi-diurnal tides a second 10-hour shift may be used to accelerate the schedule, if needed.

Due to operations occurring at times of high and low tide windows overall project operations can vary from 24 hour days during diurnal tides to only 12-18 hours on semi-diurnal tides.

3.0 Methods, Procedures, and Equipment for Excavation from the Top of Shoreline Bank

The first major work activity after site preparation is debris removal, then excavation and placement of interim backfill within the cofferdam concurrent with shoreline bank excavations. Once these activities are completed (as approved by the Owner's Project Engineer), or near completion, in-water dredging can begin (cannot occur prior to July 20).

Prior to debris removal, containment booms would be installed along the shoreline to contain turbidity and any floating debris that enters the water during demolition and

shoreline bank excavation. Due to the estimated large volume of debris present in the Jorgensen Forge shoreline bank, all debris removal will be performed prior to shoreline bank excavation. Debris removal production rates will be difficult to estimate as the difficulty in removing piles, concrete, and slag will determine production. Excavated debris will be loaded into an articulated haul truck for transport to the upland stockpile/sizing location for debris and sized with an excavator and laborers on the ground as necessary to facilitate offsite transport and disposal. Further details on demolition activities are included in the Demolition Plan, Appendix D of the RAWP.

An unlined debris sizing area will be established on a the existing concrete pad just east of the shoreline bank to manage oversized debris. This area will be cleaned as necessary to minimize the presence of soils potentially adhered to debris and the potential for trackout to minimize the potential for stormwater impacts. Protective measures (e.g., use of steel plates, crushed rock, etc.) will be implemented to minimize the potential for impacts to the concrete pad. As necessary, measures will be taken (e.g., crushed rock and liner system similar to stockpile area) to ensure any water that comes into contact with the concrete pad ~~This area~~ will be drained so that water passively flows to a sump. From the sump the water will be pumped through the water treatment system as described in the Water Treatment Plan, Appendix G of the RAWP.

Once large debris is removed, the shoreline behind the JFOS will be excavated to +11 feet MLLW to the extents shown on the JFOS design drawings Sheets S1.1 and S2.1 prepared by B&T Engineering dated January 20, 2014. This excavation will be performed by a contractor to be named pursuant to the JFOS requirements under a separate contract between the Jorgensen Forge and their selected contractor ~~(i.e., this work is being performed by the Contractor but not under the EMJ EAA scope of work).~~ Following this grading, PPM will commence excavation of the materials within the cofferdam from two different excavators staged on a barge. In accordance with the JFOS design document requirements, during excavation within the cofferdam PPM will maintain the water surface elevation at a minimum +11 feet MLLW by pumping water from the LDW into the cofferdam, if necessary..

The materials within the cofferdam will be dredged using both the Hitachi 1200 and the long reach Hitachi 470. The Hitachi 470 long reach excavator will be walked from the beach onto the barge using temporary equipment ramps. The 1200 Hitachi will begin the initial dredging of the cofferdam. The 1200 will use a standard bucket and thumb in order to to reach the corners of the cofferdam, inside the web of the sheet pile, and to handle the heavy debris in the area within the non-TSCA area. Following the Project Engineer's approval of the non-TSCA removal, the 470 Hitachi will be used to remove the TSCA level material to the design extents. The open bucket will be raised to the water surface slowly to minimize releases (water or soils/sediments) from larger debris that may be hanging out of the bucket and then lifted over the top of the cofferdam and placed directly into lined containers staged on a sediment haul barge. A spill apron consisting of a PVC sheet connected to the barge wall and drapped over the sheet pile wall will be used.

The non-TSCA materials will be transferred to a sealed sediment haul barge that will be weighted to facilitate passive dewatering to a water collection area on one side of the barge. Water that gravity drains to this area will be pumped to the adjacent on-barge water treatment system using a 6-inch Godwin pump, treated, and discharged back to the LDW in the work area as described in Appendix G of the RAWP. The de-watered sediment haul barges will be transported downstream approximately 1 mile to the PPM Yard (or similar EPA-approved transload facility) and the materials will be loaded directly into lined trucks for offsite disposal at CRL as discussed in Appendix H of the RAWP.

The TSCA-materials will be transferred directly into lined containers staged on the barge. Standing water within the lined containers will be actively removed from the containers using the 6-inch Godwin pump and pumped to the water treatment system located on the water treatment barge. Depending on the material consistency the container will only be filled three-quarters full to ensure that material is not spilt during the transportation to the landfill. In accordance with the JFOS design document requirements, during excavation within the cofferdam pumps will be used to maintain the water surface elevation within the cofferdam to a minimum +11 feet MLLW. The de-watered containers will be transported downstream approximately 1 mile to the PPM Yard (or similar EPA-approved transload facility) and a landside crane will be used to pick the lined containers off the barge and place directly onto a truck chassis for offsite disposal at Chemical Waste Management of the Northwest.

Either prior to or concurrent with the excavation within the cofferdam, the shoreline excavation will be conducted using the Hitachi 450 excavator. The excavation would progress from the south end of the Jorgensen Forge property at the sheet pile wall towards the north property line of Jorgensen Forge, as shown in Construction Drawings. Coordination will need to take place to account for the shoreline barrier to be installed by Boeing/JFC (i.e., barrier shown on Construction Drawings with west-east orientation extending from southeast corner of the cofferdam). The composition of the barrier will need to be communicated to PPM so the equipment and work can be staged and performed without adversely impacting the barrier. An excavation production rate of 500 cubic yards per day is anticipated. A grade checker will be working alongside the excavator operator to ensure the proper sloping and sufficient soil removal is being performed as the 470 moves north. Soil will be loaded into an articulated haul truck for transport and placement in the upland soil stockpile area.

The stockpile area will be built with layer impermeable PVC liner, crushed rock, and ecology blocks. Ecology blocks will be placed around the three sides of the stockpile area. A PVC liner will be placed over the blocks and down onto the footprint of the stockpile area. As necessary, additional subgrade will be placed below the liner and

graded to facilitate gravity drainage of water (water that passively leaves the materials in the stockpile area or rainfall) that comes into contact with the overlying liner. Permeable crushed rock will then be placed on top of the liner as a protective layer and a berm will be formed against the ecology blocks. The installed liner will be graded to a slope so as water passively leaves the soil it will flow to the enclosed section of the stockpile area for a 4" pump to remove the water and process it through the water treatment system as defined in the Water Treatment Plan, Appendix G of the RAWP. As available trucks and trailers arrive at the Jorgensen Forge property, the dewatered material will be loaded from the stockpile area using the Hitachi 270.

At the completion of shoreline bank excavation activities, a grade checker will verify the final excavation elevations have been achieved prior to final survey. A final survey of excavation areas will then be performed for all excavation activities that were performed from the top of bank. The Owner's Project Engineer will review the data and the Owner will approve the final survey.

4.0 Methods, Procedures, and Equipment for Dredging

Near or after the completion of upland and cofferdam excavation activities from the top of shoreline bank, dredging equipment will be mobilized to the site and dredging will be performed along the underwater portion of the bank. Dredging will occur from the south shoreline near the sheet pile wall to the north boundary of the Jorgensen Forge property. The barge will be positioned parallel to the shoreline as dredging is performed (Figure 1). The dredging equipment may also be placed perpendicular to the shoreline bank if needed to reach center dredge areas or if needed to allow for vessel traffic. The dredging will start from elevation +4 to a +2 feet MLLW depending on tides, work a 50'x30' section in front of the barge, and move from top of slope to middle of slope. The barge will then shift it's position downstream approximately 30' and another 50' wide section will be completed from top of slope to middle. This process will be repeated until the dredging reaches the boundary of the DMU. The barge will then be repositioned back upstream to where dredging was started and complete from the middle of the slope to the toe of slope in the 50'x30' dredge section. The barge will then be shifted back approximately 30' downstream and the process will continue until the barge reaches the boundary of the DMU. Once the DMU is surveyed and approved by the Owner's Project Engineer the barge will reposition itself on the southeastern corner of the next DMU and begin the sequence over again. This process will continue south to north in the dredge prism until dredging is complete. Daily progress surveys will be performed to ensure the final neat line dredge surface has been achieved before moving too far north of a DMU. Daily production rates will be difficult to estimate, as it will depend on the depth of cut at the particular point of dredging, whether the dredge is performing a cleanup pass, and type and density of sediment encountered. It is expected to be between 500 cubic yards and 1200 cubic yards per day with an average production rate of approximately 600-700 cubic yards per day.

4.1 Pre-Dredging Notification

Prior to mobilizing dredging equipment, a local Notice to Mariners will be requested from the US Coast Guard at least 14 days before the first equipment arrives at Jorgensen Forge shoreline. This is discussed in further detail in the Vessel Management Plan, Appendix I of the RAWP.

4.2 Mechanical Dredging

Mechanical dredging (open-access dredging) will be conducted throughout the in-water work areas. The dredging is highly controlled removal of impacted materials to the design grade, shown on the dredging Construction Drawings Sheet C-1, in areas below elevation of approximately +4.0 to +2.0 feet MLLW.

Mechanical dredging will be performed using a fully instrumented, barge-mounted excavator with a closed environmental Young clamshell bucket. PPM has closed rehandle and digging buckets in it's fleet to manage all material types should the Young's bucket prove ineffective at removing encountered materials. If this occurs, the Owner's Project Engineer would approve the use of an alternative bucket type prior to use.

The instrumentation and navigation system on the barge/excavator (dredge) will include all necessary navigation/positioning equipment to accurately place the cutting edge(s) of the dredge bucket to an accuracy of ±10 centimeters (cm) (4 inches) in each of the *x*-, *y*-, and *z*-coordinates. This information will be digitally and graphically displayed in real time for the dredge operator. The instrumentation will also have a telemetry system to telemetry real time display to the Owner's Project Engineer's on-site office.

Quality control associated with dredging includes compliance with BMPs and monitoring the following indicators of performance:

- Generation of residuals and suspended sediment,
- Off-site dredged material loss,
- Impacts to water quality during dredging, and
- Accuracy and consistency of the resulting post-dredge surface.

During dredging, PPM will utilize real-time, automated electronic systems, RTK-GPS, and a variety of sensors to accurately perform the work. PPM will maintain trained and competent staff on site at all times. These staff will be capable of maintaining, troubleshooting, and repairing such positioning systems. PPM will install one tidal gauge and at least two tidal staffs at the dredging location so that the dredge operator, dredging inspectors, and hydrographic surveyors can observe the water level from all in-water work locations during each construction season. The tidal staffs will be distributed throughout the extent of the work area. PPM will assure that all required gauges, targets, ranges, and other survey markers are in place and properly maintained.

4.3 Dredge Volumes

The Contract Specifications defined the bid dredge volumes based on current surface to design dredge depths (neat line dredge surface). The estimated volume based on this

theoretical section is approximately 10,700 CY. However, this surface did not account for any additional dredging required to address:

- Limitations of dredging equipment require approximately 6-inches of overdredge to remove all material cost effectively to neat line elevations,
- Achieving 2:1(horizontal:vertical) transitions,
- A design assumption that 0.0 feet MLLW could be achieved from the top of bank rather than the more likely +2.0 to +4.0 MLLW.
- Any sloughing that would likely occur during dredging.

The actual volume of sediment to be removed is expected to be approximately 13,805 CY when accounting for the above additional dredging considerations.

4.4 Dredge Water Return

Dredge water, including water that is removed by the dredge bucket, free water that separates form the dredged material, and contact water will be continuously pumped from the dredge material haul barge while dredging. Water will also be pumped from barges waiting to be transported to the offload facility if additional water is identified prior to transport. The complete water management system is described in Water Management and Treatment Plan, Appendix G to the RAWP. No haul barge dewater fluids will be discharged to the waterway without appropriate treatment.

4.5 Approval of Dredge Management Units

While all excavation and dredging must be completed to receive final Owner's Project Engineer approval for placement of "final" backfill materials, the Construction Specifications require timely placement of interim backfill (minimum 6" layer) materials in DMUs following Owner's Project Engineer approval the dredging design grades have been achieved. Based on the anticipated dredging production rates, the proposed DMUs are identified in Figure 2 but are subject to change based on conditions encountered in the field. If a DMU is not fully completed, interim backfill may not be placed within the DMU unless an acceptable buffer of approximately 50' in all directions is approved by the Owner's Project Engineer prior to placement. A hydrographic survey will be done to verify and to delineate where dredging was completed and document whether the design elevation identified in the Construction Drawings have been achieved in the DMU. Once achieved and approved by the Owner's Project Engineer, a 6"-24" layer of interim backfill material will be placed in the DMU in a timely fashion (interim placement to occur within maximum 7-10 days following dredging). Interim backfill placement shall not occur in a completed DMU until the Owner's Project Engineer has approved that the design removal elevations within a 50 feet perimeter in the adjacent DMUs has been achieved.

4.6 Navigation and Positioning

Terrasond Engineering will employ an excavator positioning system for navigation and positioning. The excavator positioning system will include angle, rotation, and magnetic closure sensors integrated with a precision RTK-GPS unit and positioning software. All

sensors will employ real-time data formats and be integrated into Hypack's Dredgepack software to provide a graphical and numerical depiction of the survey and template information while displaying the precise location of the excavator bucket.
The position and heading of the excavator will be determined by RTK GPS /Global Navigation Satellite System). A base station will be established at the project site to provide consistent corrections for the equipment and survey vessels on the project. Detailed information on the operation of the excavation positioning system is provided in the Survey Plan.

5.0 Methods, Procedures, and Equipment for Barge Transportation

All barging within the dredge prism will be done with a combination of the push tugs and spud anchors on the barge. The dredge operator will use the position software to verify that during dredging the spuds are not pulled from a contaminated area and placed into a recently backfilled area. The sediment barge will be moved from the dredge prism to transload area by the tugboat Sonja H. The tugboat will transport the filled sediment barge from the dredge area to the transload facility. Once there, the tugboat will immediately transport an empty sediment barge back to the dredge area. This will be done before the work shift is over to make sure the dredge equipment is ready to perform dredging at the start of the next shift.

6.0 Methods and Methods for Operating the Staging/Stockpile Area

Operating the staging and stockpile areas is discussed in the Temporary Facilities and Controls and Environmental Pollution Controls Plan, Appendix C of the RAWP.

7.0 Progress Surveys

Daily progress surveys are discussed in detail in the Survey Plan, Appendix K of the RAWP. A summary of survey methods is provided below.

7.1 Hydrographic Surveys

Progress bathymetric surveys will be performed to track the progress of dredging activities on a daily basis and ensure additional dredging is not required within a DMU. A final dredging survey will be performed within all DMUs at the completion of dredging activities. These final surveys will be reviewed by the Owner's Project Engineer and approved when the design removal elevations are achieved. Once approved, interim and final backfill materials will be placed on the final removal elevation surface.

7.2 Shoreline Bank Surveys

A final upland/shoreline bank survey will be performed within all areas excavated from the top of bank at the completion of excavation activities. This survey may be performed in steps with the upland excavation being surveyed independently of the shoreline bank areas. Additionally, a portion of the upland excavation areas may be bathymetrically surveyed by Terrasond from the water during high tides. This final survey will be reviewed by the Owner's Project Engineer and approved when the design removal elevations are achieved. Once approved, the shoreline containment materials will be placed on the final removal elevation surface.

8.0 Debris Removal

Up to two shifts have been planned for in-water debris removal activities during dredging. This debris may include concrete piers or pilings, timber pilings or buried logs, slag, anchors, steel cables, and any other miscellaneous materials historically deposited or washed downstream. Demolition and debris removal is discussed in detail in the Demolition Plan, Appendix D of the RAWP.

9.0 Decontamination

Decontamination will take place after completion of the following work activities:

- After Schedule A removal, prior to placement of Schedule A backfill
- After dredging of base bid material, prior to placement of interim backfill
- After final dredging of base bid material, prior to placement of intermediate and final backfill
- After final completion of all dredging and dewatering activities
- After excavation of shoreline bank, prior to placement of shoreline containment materials
- After final completion of all shoreline excavation and dewatering activities

9.1 Dredging Equipment Decontamination Procedures

After the removal of the TSCA materials within the cofferdam, the 1200 Hitachi excavator boom and bucket will be decontaminated prior to dredging in the non-TSCA areas. The dredge bucket and boom will be decontaminated using a "hotsie" pressure washer equipped with a detergent/surfactant additive reservoir, to remove all soils and sediments. The detergent of choice shall be a water/Alconox™ mixture. The decontamination will occur on the sediment barge so the water generated can be removed with the dewatering pumps and treated in the water treatment system.
This process will also be used each time prior to an interim backfill placement by the 1200 Hitachi.

Once final dredging activities are completed and approved by the Owner's Project Engineer, the dredging equipment, dewatering and water treatment equipment, and

barges will be decontaminated. Sediment that has accumulated in the water treatment tanks will be pumped through the tanks to the last stage tanks (weir tanks) and then transferred to the sediment barge by manual pumping down, pressure washing, and hand shoveling.

The inside of the sediment haul barges will be cleaned using the dredge bucket and then by hand using shovels. Sediment will be transferred into a single final sediment haul barge. When the majority of the sediment has been removed from each barge, the barge will be rinsed by pumping water into the barge and running the rinse water through the barge water treatment system. A final decontamination process will be needed on the water treatment system; however, the amount of sediment is anticipated to be minimal due to removing sediment from the system prior to final cleaning of the barges. The final sediment barge off-loaded will be rinsed with water pumped from the waterway and sent through the barge water treatment system. The final decontamination of sediment and associated rinse water from the barge water treatment system will be performed using a vacuum truck. The final vacuum rinse water will be either transported to a permitted off-site disposal facility or discharged to the sewer under a King County Industrial Waste Discharge Permit.

9.2 Upland Equipment Decontamination Procedures

The 470 Hitachi excavator will be decontaminated before placing shoreline containment material. Any part of the excavator that was in contact with contaminated soil will be decontaminated using a "hotsie" pressure washer equipped with a detergent/surfactant additive reservoir, to remove all soils and sediments. The detergent of choice shall be a water/Alconox™ mixture. The decontamination will occur in the upland stockpile area so the water generated can be removed with the dewatering pumps and treated in the water treatment system. This process will also be used any time that the excavator is required to switch from a contaminated work activity to a clean work activity.

Once final excavation activities are completed and approved by the Owner's Project Engineer, the shoreline equipment, dewatering and water treatment equipment, and stockpile and debris sizing areas will be decontaminated. All equipment will be decontaminated using the above procedure inside of the stockpile area. The water generated will be captured by the dewatering system and processed. The final decontamination of sediment and associated rinse water from the shoreline water treatment system will be performed using a vacuum truck. The final vacuum rinse water will be either transported to a permitted off-site disposal facility or discharged to the sewer under a King County Industrial Waste Discharge Permit.

10.0 Contractor Quality Control

Please refer to the Contractor Quality Control Plan located in the RAWP and again in this document as Attachment A, The QC Plan details quality control and assurance procedures that will be conducted to ensure work is performed consistent with contract specifications and design drawings.

10.1 Organization Chart

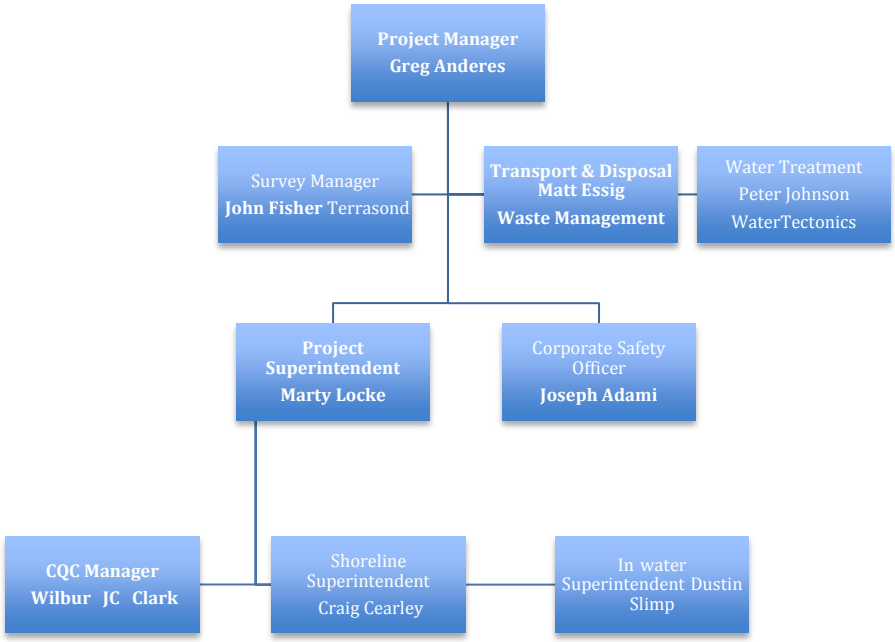

Figure 1- Dredge Equipment Position

LEGEND:

- NAVIGATION CHANNEL
- EXISTING CONTOUR (1 FT INTERVAL)
- SAND BAG/FILTER GRAVEL BERM
- APPROXIMATE TOP OF BANK
- EXISTING BOEING SHEETPILE WALL
- CONTAINMENT BARRIER (DO NOT DISTURB)
- TEMPORARY SECURITY FENCE
- STRUCTURES TO BE PRESERVED AND PROTECTED ADJACENT TO DREDGE/EXCAVATION LIMITS

N

MAIN BUILDING

PROPERTY LINE

PROPERTY LINE

1200 HITACHI EXCAVATOR

DREDGE BARGE "WEB" 142' X 60'

ECOLOGY BLOCK WALL

TREATMENT SYSTEM DISCHARGE LINE

SEDIMENT BARGE "KP1 OR KP2" 180' X 50'

6" PUMP

DE-WATERING BARGE "FLEXI FLOAT" 120' X 50'

DREDGE WATER LINE

PRIMARY TREATMENT SYSTEM

SECONDARY TREATMENT SYSTEM

0 15' 30' 60' 90'

1" = 30'-0"

NO.	ISSUE/DESCRIPTION	BY	DATE

JORGENSEN FORGE EARLY ACTION AREA
DUWAMISH WATERWAY
SEATTLE, WASHINGTON

DREDGE EQUIPMENT LAYOUT
PLAN VIEW

PREPARED BY:
Pacific Pile & Marine
Pacific Pile & Marine, LP
Seattle Office
582 South Riverside Drive
Seattle, WA 98108

PREPARED FOR:
EARLE M. JORGENSEN COMPANY

PROJ MGR: JC	REVIEWED BY: JC	CHECKED BY: JC	FIGURE 4
DESIGNED BY: JC	DRAWN BY: JC	SCALE: AS NOTED	
DATE: 03/14/2014	PROJECT NO.	REVISION NO. 0	SHEET NO. 1 OF 1

Figure 2- Dredge Management Units

CONTROL POINTS		
POINT #	NORTHING	EASTING
1	195800.6	1275755.2
2	195787.9	1275763.7
3	195780.0	1275752.1
4	195683.7	1275816.1
5	195446.4	1275912.1
6	195448.5	1275917.7
7	195397.1	1275938.5
8	195395.9	1275935.7
9	195352.6	1275953.2
10	195355.5	1275960.7
11	195300.8	1275982.8
12	195665.0	1275731.0
13	195665.1	1275743.9
14	195665.2	1275754.6
15	195646.4	1275751.4
16	195633.8	1275767.2
17	195630.8	1275768.4
18	195665.4	1275776.1
19	195641.3	1275785.8

CONTROL POINTS		
POINT #	NORTHING	EASTING
20	195665.5	1275791.3
21	195646.7	1275798.9
22	195665.7	1275813.8
23	195654.5	1275818.3
24	195605.3	1275796.4
25	195590.5	1275800.1
26	195591.5	1275802.1
27	195598.2	1275818.8
28	195605.6	1275837.5
29	195581.2	1275802.4
30	195561.2	1275810.6
31	195526.8	1275815.7
32	195527.7	1275818.2
33	195529.8	1275823.2
34	195540.8	1275850.6
35	195542.0	1275853.4
36	195545.4	1275861.8
37	195467.2	1275830.4
38	195468.6	1275833.8

CONTROL POINTS		
POINT #	NORTHING	EASTING
39	195471.6	1275840.8
40	195475.3	1275850.3
41	195479.8	1275861.4
42	195484.7	1275873.4
43	195489.5	1275885.2
44	195400.6	1275846.8
45	195405.8	1275859.4
46	195412.4	1275875.6
47	195429.8	1275871.4
48	195433.5	1275880.2
49	195443.4	1275904.8
50	195444.8	1275908.6
51	195394.5	1275885.7
52	195409.9	1275924.0
53	195392.8	1275928.3
54	195337.0	1275862.5
55	195340.3	1275870.7
56	195342.6	1275876.4
57	195352.3	1275900.0

CONTROL POINTS		
POINT #	NORTHING	EASTING
58	195353.2	1275902.4
59	195353.9	1275904.3
60	195360.2	1275919.8
61	195366.8	1275936.2
62	195340.2	1275922.9
63	195341.9	1275927.1
64	195348.7	1275943.5
65	195299.6	1275977.9
66	195333.0	1275863.4
67	195328.6	1275845.8
68	195289.8	1275855.4
69	195294.1	1275872.9
70	195280.2	1275876.5
71	195284.7	1275887.6
72	195286.8	1275892.4
73	195289.0	1275898.0
74	195296.9	1275917.8
75	195300.3	1275925.9
76	195303.0	1275932.9

CONTROL POINTS		
POINT #	NORTHING	EASTING
77	195304.9	1275937.2
78	195316.9	1275967.1
79	195290.2	1275935.8
80	195298.8	1275973.7
81	195187.8	1275899.2
82	195189.1	1275905.4
83	195190.0	1275909.2
84	195197.2	1275940.4
85	195198.9	1275948.4
86	195200.7	1275956.1
87	195203.3	1275967.9
88	195211.4	1276003.0
89	195143.4	1275910.2
90	195144.6	1275915.5
91	195146.7	1275925.1
92	195154.1	1275957.3
93	195158.9	1275978.0
94	195161.1	1275988.1
95	195166.9	1276013.2

CONTROL POINTS		
POINT #	NORTHING	EASTING
96	195167.7	1276017.2
97	195122.2	1275915.4
98	195122.0	1275930.8
99	195121.5	1275964.8
100	195121.1	1275997.3
101	195120.7	1276027.9
102	195301.7	1275986.6
103	195308.3	1276026.3
104	195703.5	1275867.8
105	195790.2	1275809.4
106	195790.2	1275787.3
107	195812.3	1275772.8

LEGEND:

- NAVIGATION CHANNEL
- EXISTING CONTOUR (1 FT INTERVAL)
- EXISTING BOEING SHEETPILE WALL
- CONTAINMENT BARRIER (BY OTHERS, DO NOT DISTURB, ALIGNMENT SUBJECT TO CHANGE)
- TEMPORARY SECURITY FENCE
- DREDGE/EXCAVATION LIMITS
- PROTECT EXISTING MONITORING WELL
- REQUIRED DREDGE ELEVATION (FT MLLW)
  TOP OF SIDESLOPE
  FINAL GRADE
  DREDGE COORDINATE
  DREDGE BOUNDARY (DENOTES CHANGE IN ELEVATION)
- SLOPE ARROW
- STRUCTURES TO BE PRESERVED AND PROTECTED ADJACENT TO DREDGE/EXCAVATION LIMITS
- TOE TRENCH TO BE CONSTRUCTED AT BASE OF 2H:1V BANK DREDGE/EXCAVATION SLOPE, SEE 1/C-10
- CONTROL POINT
- JFOS IMPACTED MATERIAL AREA - SCHEDULE A (SEE DRAWING C-5A)

NOTES:

1. HORIZONTAL DATUM: WASHINGTON STATE PLANE NORTH ZONE, NAD 83 FEET.
2. VERTICAL DATUM: MEAN LOWER LOW WATER (MLLW).
3. FINAL DREDGE MANAGEMENT UNIT (DMU) PLAN TO BE DEVELOPED AT PRE-CONSTRUCTION BASED ON CONTRACTORS EQUIPMENT AND APPROACH.
4. A NOMINAL 6-INCHES OF BACKFILL MATERIAL WILL BE PLACED OVER THE DREDGE OR EXCAVATION CUTS WITHIN A DMU, AS SOON AS PRACTICAL, AFTER THE DREDGING AREA IS COMPLETED AND ACCEPTED BY THE ENGINEER.
5. IN-WATER DREDGE/EXCAVATION LIMIT WILL BE DEFINED BY A 2H:1V CATCH SLOPE FROM THE TOE OF CUT.

PROTECT CONTAINMENT BARRIER (INSTALLED BY OTHERS, ALIGNMENT SUBJECT TO CHANGE)

MAINTAIN 5' OFFSET FROM BUILDING

MAINTAIN 5' OFFSET FROM CONCRETE PAD

PROPERTY LINE

APPROXIMATE 2H:1V SLOPE TRANSITIONS TO EXISTING GROUND AT 5' OFFSET FROM WALL

WALL OFFSET (5' MIN)

DMU 6

DMU 5

DMU 4

DMU 3

DMU 2

DMU 1

42" Boeing Outfall Pipe

24" Boeing Outfall Pipe

APPROXIMATE BOEING DREDGE AREA (TO BE COMPLETED BY OTHERS)

LOWER DUWAMISH WATERWAY

NORTH

0 30 60

SCALE IN FEET

ONE INCH AT FULL SIZE. IF NOT ONE INCH SCALE ACCORDINGLY

REVISED BID SET 02-05-14

K:\Projects\0224-Fwalton Consulting\Jorgensen Forge Facility EE-CA Implement\Construction Plans\0224-C-Dredge.dwg 6 C-1

Feb 04, 2014 5:19pm rgoode

ANCHOR QEA

EARLE M. JORGENSEN COMPANY

BRYAN PATRICK BARTH STATE OF WASHINGTON 41775 REGISTERED PROFESSIONAL ENGINEER

REVISIONS				
REV	DATE	BY	APP'D	DESCRIPTION
1	12-16-13			ADDENDUM #2
2	1-28-14			CONTAINMENT BARRIER WALL CHANGES

DESIGNED BY: R. PICKERING
DRAWN BY: T. GRIGA
CHECKED BY: J. VERDUIN
APPROVED BY: R. BARTH
SCALE: AS NOTED
DATE: NOVEMBER 2013

JORGENSEN FORGE EARLY ACTION AREA

DREDGE/EXCAVATION PLAN

C-1

SHEET NO. 6 OF 17

ATTACHMENT A- Contractor Quality Control Plan

QUALITY CONTROL PLAN

JORGENSEN FORGE EARLY ACTION AREA

Jorgensen Forge Corporation
Seattle, WA

Prepared for:

ANCHOR QEA

720 Olive Way, Suite 1900
Seattle, WA 98101

Prepared by:

Pacific Pile&Marine

700 S. Riverside Dr.
Seattle, WA 98108

Pacific Pile&Marine

Table of Contents

Introduction

Pacific Pile & Marine, LP (Pacific Pile) has developed this Contractor Quality Control (CQC) Plan in accordance with Specification Section 014500 for the Jorgenson Forge Early Action Area Remediation Project at the Jorgenson Forge Corporation in Seattle, Washington. This document establishes the Quality Control System for Pacific Pile to provide the necessary supervision, controls, and testing of all items of work, including that of suppliers and subcontractors, that will ensure the compliance with Contract Specifications and design drawings. This includes contractor-furnished equipment, materials, workmanship, construction, finish, functional performance, and identification.

Construction activities planned as part of the cleanup include in-water dredging, placement of in-water backfill and shoreline materials, reconfiguring the shoreline bank, and transport and off-site disposal of impacted sediments and soils.

The scope of work for the Project consists of the following elements:

- Demolition Activities: Shoreline demolition activities are required to excavate impacted bank soil. Demolition activities include removal of the current property fence along the shoreline; cutting back and grouting stormwater outfalls, removal of miscellaneous bank debris including concrete, brick, wood, and slag and removal of wooden piles.

- Dredging and backfill with the JFOS coffer dam area. This work includes removal of Subtitle D material to a design surface, then removing Subtitle C TSCA and non-TSCA material to a design depth, and filling the area with clean fill material.

- In-Water Dredging Areas: Dredging of sediments and subsequent backfilling in the Lower Duwamish Waterway (LDW).

- Bank Excavation and Backfill: Excavation of soil from the bank and subsequent backfilling of the bank of the LDW.

- Water Management: Water Management and continuous treatment of dredge water and other water related construction activities.

The construction work will be performed by Pacific Pile under contract to EMJ and oversight will be performed by Anchor QEA, LLC (Anchor) acting as the Engineer.

1.0 QUALITY POLICY and AUTHORITY

Pacific Pile & Marine recognizes that in today's competitive marketplace, effective quality systems are essential when providing quality cost effective services to our clients. Management is totally committed to providing Commercial & Industrial General Contracting Services that comply fully with the specifications and expectations of our valued clients. Therefore, it is the policy of Pacific Pile & Marine to adhere strictly to this quality control program and to insure that this program and the requirements of our customers are met on each and every project we execute.

Full authority for the implementation and administration of the quality controls described in this manual has been delegated to the Quality Control Manager "QCM". The QCM has the responsibility and organizational freedom to identify quality control problems, stop work, recommend solutions and verify resolution of such problems. The QCM shall also have the responsibility of documenting the established Quality Assurance / Quality Control Programs in a manner that strives to comply with ISO 9002 Quality Systems. The ultimate objective of this company's QA/QC program is to comply fully or surpass the quality standards established by ISO 9002.

Project Managers are responsible for their assigned project's QA/QC activities. They may delegate the performance of their assigned duties to qualified individuals, but they shall retain full responsibility for completing their projects in strict accordance with established quality control policies and the client's specifications.

The quality of all subcontractors and vendors shall be the joint responsibility of the QCM and the applicable Project Manager. All projects will be executed in a manner that emphasizes safety, quality, schedule and maximum cost effectiveness.

Any commitment, conflicts, or non-conformance issues not resolved using current established Quality Assurance / Quality Control Procedures shall be brought to the attention of the undersigned for final resolution.

Eric Reichelt
Pacific Pile & Marine
Partner

Wil Clark
Pacific Pile & Marine
Partner

2.0 MANAGEMENT RESPONSIBILITY

2.1 RESPONSIBILITY

Management has the responsibility to define and document its policy and objectives for, and commitment to, quality. Management will ensure that its policy is understood, implemented, and maintained at all levels of the organization.

All employees have the responsibility and authority for implementation of established QA/QC activities. Resolution of conflicts in QA/QC policies shall flow through the organizational chain of command as follows:

1. Field Employees
2. Craft Leaders
3. General Foreman
4. Field Superintendents
5. General Superintendent – Marty Locke
6. Project QA/QC Manager – JC Clark
7. Project Manager – Greg Anderes
8. Quality Control Manager – Steve Spencer
9. President – Wil Clark

It is the responsibility of any employee that manages, performs, or verifies work affecting quality to:

a. Initiate action to prevent the occurrence of work or service non-conformity;
b. Identify and record any quality problems;
c. Initiate, recommend, or provide solutions through designated channels;
d. Verify the implementation of solutions;
e. Control further processing, delivery, or installation of non-conforming work until the deficiency or unsatisfactory condition has been corrected.

2.2 ALLOCATION OF RESOURCES AND PERSONNEL

Management shall identify in-house requirements and provide adequate resources and trained personnel as needed to support required QA/QC verification activities. Verification activities shall include inspection, testing and monitoring of the construction / installation processes and audits of the quality systems. These activities shall be carried out by personnel independent of those having direct responsibility for the project being executed.

2.3 MANAGEMENT REVIEW

The established QA/QC policies and procedures shall be reviewed at appropriate intervals by management to ensure continuing suitability and effectiveness. These reviews will include assessment of the results of internal

audits and shall assess overall conformance to client's requirements and expectations. Records of such reviews and audits shall be maintained.

3.0 QUALITY SYSTEMS

Pacific Pile & Marine's staff has established and shall maintain and document this QA/QC system as a means of ensuring that the services we provide our clients conform to specified requirements. This QA/QC system shall include:

a) Documented quality system procedures and instructions to ensure that all activities are performed in accordance with established requirements;
b) Effective management support to ensure compliance and the use of the QA/QC procedures and instructions.

All employees of Pacific Pile & Marine shall strive to improve the quality of our services to our clients. The QA/QC program is a process of continuous improvement which requires input from everyone in our organization. Everyone in our organization shall comply and endeavor to improve the process where possible. An effective QA/QC program consists of the following key components;

a) Established QA/QC procedures and instructions that comply with generally accepted industry standards, Federal, State, and Local regulating authorities, and the project specifications and standards established by the client;
b) The identification and timely issuance to the project team any required controls, processes, inspection equipment, fixtures, tools, materials and labor skills needed to properly execute the project;
c) Updating, as necessary, of quality control, inspection, and testing techniques, including the development of new methods and procedures;
d) Identification of any commitments made which exceeds available resources in sufficient time to properly acquire the required resources;
e) Clarification of the standards of acceptability as required to support the overall QA/QC program and our client's objectives;
f) Review of the project process, construction, installation, inspection, and test procedures to ensure that applicable documentation reflects how activities are actually performed;
g) Effective maintenance of quality records to document and track performance and improvement.

The QA/QC manual is not a controlled document. A copy is available to all employees through their immediate supervisor. **The QA/QC manual is designed to convey basic QA/QC procedures and instructions that must be followed by all employees and subcontractors of Pacific Pile & Marine.**

Specific QA/QC procedures and instructions for individual activities are maintained by the QCM and issued to Project Managers as controlled documents. It is the Project Manager's responsibility to ensure specific activity

QA/QC procedures and instructions are conveyed to the individuals or subcontractors performing the specified activities.

4.0 PROJECT REVIEW and SETUP

4.1 PROPOSAL SUBMISSION AND RESPONSIBILITY ASSIGNMENT

Upon receipt of a Request for Proposal (RFQ) from a client, management will review the requirements of the RFQ and determine if a proposal will be submitted to perform the work. If management decides to submit a proposal for the work, a Project Manager is assigned the responsibility of generating the proposal to perform the work. The proposal must include all costs related to completing the work in accordance with the client's specifications.

4.2 RFQ and CONTRACTUAL REVIEW

The Project Manager shall review the contract documents contained in the RFQ and establish and maintain procedures to ensure that:

a. The requirements and acceptance specifications of the client are adequately defined and documented;
b. Any requirements differing from those included in the proposal are resolved or clarified in the proposal;
c. That Pacific Pile & Marine has the capability to meet all contractual requirements of the RFQ and any ensuing contract;
d. Records of such contract reviews shall be maintained for future reference.

The RFQ and contract review activities, interfaces, and communication shall be coordinated with the client as required to clarify all issues and to ensure that the responsibilities of both parties are well defined and documented.

4.3 PROPOSAL PREPARATION

The Project Manager shall set up the project structure as the proposal for the work is generated. It is the responsibility of the Project Manager to ensure that all costs related to executing the work in accordance with established QA/QC procedures and the contract requirements are included.

The process of identifying all material and subcontractor requirements shall be in accordance with established QA/QC procedures. Proper sourcing during the proposal stage will make actual purchasing and subcontracting activities much more efficient after award of the work.

Once all costs have been identified and a execution/staffing plan has been developed, the Project Manager shall schedule a meeting with management to review the proposal's risks and contingencies. Final decisions concerning proposal pricing and clarifications shall be management's responsibility.

4.4 PROJECT SETUP

Upon award, the Project Manager shall immediately setup the project in accordance with the execution and staffing plan established during the proposal. All key staff members shall be notified and sent as much information concerning their responsibilities to the project as soon as possible. A complete project schedule including is being submitted as part of the overall RAWP.

The Project Manager shall develop a project QA/QC file containing the basic QA/QC manual and all related specific activities' QA/QC procedures and instructions. The project QA/QC manual shall be reviewed and approved by the QCM.

5.0 DOCUMENT CONTROL

5.1 CONTROL OF QA/QC MANUALS, PROCEDURES and INSTRUCTIONS

Specific QA/QC procedures and instructions for individual activities are maintained by the QCM and issued to Project Managers as controlled documents. It is the Project Manager's responsibility to ensure specific activity QA/QC procedures and instructions are conveyed to the individuals or subcontractors performing the specific activities.

Revisions to the QA/QC documents shall be by section and approved for adequacy by authorized personnel prior to issue. A revised table of contents indicating the newly issued approved and accepted revision shall accompany the revised sections. In the case of sample forms a revised "Listing of Exhibits" shall indicate the latest exhibit revisions.

The QCM shall ensure that:

a. All pertinent issues of appropriate QA/QC documents are available at all locations where operations essential to the effective functioning of the quality system are performed;
b. All obsolete documents are promptly removed from all points of issue or use.

A master list or equivalent document control procedure shall be established to identify the current revision of documents in order to preclude the

use of non-applicable documents. Documents shall be re-issued after a practical number of changes have been made.

5.2 CONTROL OF PROJECT RELATED DOCUMENTS

Upon award, each project is assigned a project number and the Project Manager establishes a "Project Job File". This file shall contain a complete set of all project related contract documents, specifications, drawings, etc. All information generated during the life of the project shall be maintained in this job file. Documents that will be on controlled distribution include manuals, instructions, procedures, specifications, drawings, inspection plans, test plans and field change requests.

A listing shall be made of all drawings, specifications, vendor data, etc. that are to be submitted to the client for review and approval. Each critical submittal will be listed and tracked individually on the Project Schedule. A copy of all documents returned by the client approved, or approved as noted, shall be maintained in the job file.

Any revisions to the contract documents shall be date stamped on the date received and reviewed by the Project Manager for any possible impact to the project. All changes after contract award shall be properly documented and any associated addition or deduction to the contract price shall be immediately identified and submitted to the client for review and approval.

A complete set of all documents required for proper execution of the work shall be maintained at the project site. Any revisions received shall be immediately forwarded to the project site for use while executing the project. Any field changes to the work shall be properly noted on the project site set of the drawings. The project site set of the drawings shall show the work exactly as the work was built (hereinafter referred to as the "As-Built" set of drawings).

6.0 PURCHASING and MATERIAL CONTROL

6.1 GENERAL PURCHASING REQUIREMENTS

The Project Manager has the overall responsibility to ensure that all materials and services purchased are in accordance with the established QA/QC procedures, the project specifications, and drawings.

6.2 SUBCONTRACTING REQUIREMENTS

All subcontractors shall be selected on the basis of their ability to meet subcontract requirements, including established quality requirements. Pacific Pile & Marine has established a list of qualified subcontractors for services

typically subcontracted. Award of a subcontract to a company not on the approved subcontractors list requires written approval of the QCM.

Subcontractors PPM plans to utilize include Water Tectonics, Boyer Towing, and Terrasond Engineering and each meet PPM's quality requirements.

The selection of subcontractors, and the type and extent of control exercised by the Project Manager shall be dependent upon the type of service, client requirements, and, where appropriate, on records of subcontractors' previously demonstrated capability and performance. The Project Manager shall ensure that applicable QA/QC procedures are followed by all subcontractors performing services for Pacific Pile & Marine. Applicable client contract requirements and liabilities shall be agreed upon in writing by all subcontractors.

6.3 MAINTENANCE OF PURCHASING DATA

All purchasing documents shall contain data clearly describing the material or service ordered, including, where applicable:

a. The type, class, style, grade, or other precise identification of items purchased;
b. The title or other positive identification, and applicable issue dates of specifications, drawings, process requirements, inspection instructions, and other relevant technical data, including requirements for approval or qualification of product, procedures, process equipment, and personnel;
c. The title, number, and issue of the quality system standard to be applied to the product.

The Project Manager shall review and approve purchasing documents for adequacy of specified requirements prior to release.

6.4 VERIFICATION OF PURCHASED PRODUCTS

The Engineer shall be afforded the right to verify at source or upon receipt that purchased materials or work conforms to specified requirements. Verification by the Engineer shall not absolve the Project Manager of the responsibility to ensure that acceptable materials are used in the performance of the work.

The Engineer's verification at a vendor or subcontractor's plant shall not be used by the Project Manager as evidence of effective control of quality by the vendor

7.0 MATERIAL CERTIFICATION & TRACEABILITY

7.1 CLIENT SUPPLIED MATERIALS and EQUIPMENT

The Project Manager shall ensure that all materials and equipment furnished by the client are verified, stored, and maintained until incorporation into the work. Any such items that are damaged or otherwise unsuitable for use shall be recorded and reported to the client immediately. Proper notification to the client of receipt of any unusable materials or equipment must be made in order to ensure that the client retains the responsibility for providing useable materials or equipment.

7.2 PRODUCT IDENTIFICATION AND TRACEABILITY

Where appropriate, the Project Manager shall establish and maintain procedures for identifying materials and equipment from applicable drawings, specifications, or other documents, during all stages of production, delivery, and installation.

Where, and to the extent that, traceability is a specified requirement of the contract, individual products or product batches shall have a unique identification. This identification shall be recorded in the Job File and issued to the client with specified "As-Built" data.

8.0 PROCESS CONTROLS

8.1 MANAGEMENT OF PROCESS CONTROLS

During project setup the Project Manager develops the project QA/QC plan covering all construction activities and applicable processes which directly affect quality. The Project Manager shall ensure that these processes are carried out under controlled conditions.

The controlled conditions shall include the following:

a. Documented work instructions defining the manner of executing the work to ensure that an acceptable level of quality is maintained at all times. The instructions shall also specify equipment, materials, skills and working environments required to comply with applicable standards, codes, and quality plans;
b. Monitoring and control of suitable process and work characteristics during execution of the work;
c. Clear identification of the required approval of processes;

d. Criteria for workmanship which shall be stipulated, to the greatest practicable extent, in written standards or by means of representative samples.

8.2 SPECIFIC ACTIVITY PROCESS CONTROLS

Specific Activity Process Controls are for activities where the results cannot be fully verified by subsequent inspection and testing. Accordingly, continuous monitoring and / or compliance with documented procedures are required to ensure that the specified requirements are met.

Management shall continue review of established QA/QC procedures to ensure ongoing suitability and effectiveness. As the need for new activity QA/QC process procedures is identified they will be created and implemented. Records shall be maintained for qualified processes, equipment, and personnel, as appropriate.

The following Specific Activity QA/QC Procedures shall be followed when performing applicable activities:

a. Business Acquisition, Estimating and Proposal Preparation
b. Purchasing, Material Control and Subcontracting
c. Project Management and Cost\Document Control
d. Civil and Site Work
e. Concrete Foundations
f. Buildings and Structures
g. Mechanical Systems
h. Electrical Systems
i. HVAC Systems

9.0 INSPECTION & TESTING

9.1 INSPECTION AND TESTING OF PURCHASED MATERIALS AND EQUIPMENT

All materials and equipment shall be inspected and tested to ensure conformance with the project requirements before it is released for use. Verification that all items conform to specified requirements of the quality plan shall be documented and filed in the project QA/QC file. In determining the amount and nature of inspections, consideration should be given to the control exercised at the manufacturing source and documented evidence of quality conformance provided from the supplier.

Where incoming materials are released for urgent construction purposes, it shall be positively identified and recorded in order to permit immediate recall and replacement in the event of nonconformance to specified requirements.

9.2 INSPECTION AND TESTING DURING CONSTRUCTION

During actual construction of a project, the Project Manager shall ensure that:

a. All inspection and testing activities are performed in accordance with the quality plan and documented procedures;
b. Ensure specification and drawing conformance by the use of established process monitoring and control methods;
c. Ensure that all required inspections and tests have been completed and necessary reports have been received and verified before the finished work is released to the client.
d. Identify and correct any nonconforming work.

9.3 FINAL INSPECTION AND TESTING

The quality plan or documented procedures for final inspection and testing require that all specified inspection and tests, including those specified either by established quality procedures or the client, are carried out and that the work meets specified requirements.

The Project Manager shall ensure that all final inspections and testing activities are in accordance with the quality plan and documented procedures. Upon completion, all associated data and documentation shall be properly filed in the project QA/QC file and submitted to the client as required.

9.4 INSPECTION AND TEST RECORDS

The Project Manager shall ensure that all records which give evidence that the work has passed specified inspection and / or testing acceptance criteria are maintained in the project QA/QC file for future reference.

9.5 INSPECTION AND TEST STATUS

The inspection and test status of the work shall be identified by using markings, authorized stamps, tags, labels, routing cards, inspection records, test software, physical location, or other suitable means, which indicate the conformance or nonconformance of work with regard to inspections and tests performed. The identification of inspection and test status shall be maintained, as necessary, throughout the project to ensure that all work has passed the required inspections and testing specified.

Records shall identify the inspection authority responsible for the release of conforming work.

10 INSPECTION, MEASURING, & TEST EQUIPMENT

The QCM shall ensure that all inspection, measuring, and test equipment is controlled, calibrated, and maintained, whether owned by Pacific Pile & Marine, on loan, or provided by the client. Equipment shall be used in a manner which ensures that measurement uncertainty is known and is consistent with the required measurement capability.

The QCM shall:

a. Identify the measurements to be made, the accuracy required, and select the appropriate inspection, measuring, and test equipment;
b. Identify, calibrate, and adjust all inspection, measuring, and test equipment and devices that can affect work quality at set intervals to ensure that certified equipment having a known valid relationship to nationally recognized standards - where no such standards exist, the basis used for calibration shall be documented;
c. Establish, document, and maintain calibration procedures, including details of equipment type, identification number, location, frequency of checks, check method, acceptance criteria, and the action to be taken when results are unsatisfactory;
d. Ensure that the inspection, measuring, and test equipment is capable of the accuracy and precision necessary;
e. Identify inspection, measuring, and test equipment with a suitable indicator or approved identification record to show the calibration status;
f. Maintain calibration records for inspection, measuring, and test equipment;
g. Assess and document the validity of previous inspection and test results when inspection, measuring, and test equipment is found to be out of calibration;
h. Ensure that the environmental conditions are suitable for the calibrations, inspections, measurements, and tests being carried out;
i. Ensure that the handling, preservation, and storage of inspection, measuring, and test equipment is such that the accuracy and fitness for use is maintained;
j. Safeguard inspection, measuring, and test facilities, including both test hardware and test software, from adjustments which would invalidate the calibration setting.

Where test hardware (jigs, fixtures, templates, patterns) or test software is used as suitable forms of inspection, they shall be checked to prove that they are capable of verifying the acceptability of the work prior to use during construction. All test hardware shall be rechecked at prescribed intervals. The Project Manager shall establish the extent and frequency of such checks and shall maintain records as evidence of control. Measurement design data shall be

made available, when required by the client or his representative, for verification that it is functionally adequate.

11 CONTROL OF NONCONFORMING ACTIONS & CORRECTIVE ACTIONS

11.1 CONTROL OF NONCONFORMING WORK

The Project Manger shall establish and maintain procedures to ensure that any work that does not conform to specified requirements is prevented from inadvertent release to the client. Control shall provide for identification, documentation, evaluation, segregation when practical, disposition of nonconforming work, and for notification to management as required.

11.2 NONCONFORMITY REVIEW AND DISPOSITION

Nonconforming work shall be reviewed in accordance with documented procedures.

The nonconforming work may be:

a. Reworked to meet the specified requirements
b. Accepted with or without repair by concession of the client
c. Reused for alternative applications
d. Rejected, torn out, scrapped and new work performed.

Where required by the contract, the proposed use or repair of the nonconforming work to specified requirements shall be reported for concession to the client or his representative. The description of nonconformity that has been accepted, and of repairs, shall be recorded to denote the actual condition.

Repaired and reworked work shall be re-inspected in accordance with documented procedures.

11.3 CORRECTIVE ACTION

The Project Manager shall establish, document, and maintain procedures for:

a. Investigating the cause of nonconforming work and the corrective action needed to prevent recurrence;
b. Analyzing all processes, work operations, concessions, quality records, service reports, and customer complaints to detect and eliminate potential causes of nonconforming work;

c. Initiating preventative actions to deal with problems in relation to the risks encountered;
d. Applying controls to ensure that corrective actions are taken and their effectiveness;
e. Implementing and recording changes in procedures resulting from corrective actions.

12 AUDITS, RECORDS and TRAINING

12.1 INTERNAL QUALITY AUDITS

The QCM shall carry out internal audits to verify whether quality activities comply with planned arrangements and to determine the effectiveness of the quality system. The QCM shall maintain records on the performance and adequacy of each project's QA/QC activities.

Audits shall be scheduled on the basis of the status and importance of the activity. The audits and follow-up actions shall be carried out in accordance with documented procedures established to ensure improvement to overall company QA/QC program.

The results of the audits shall be documented and brought to the attention of the president within 10 days or sooner when critical action is required, after each internal quality audit. Each audit report shall have the actions started and planned by the QCM and Project Manager for any nonconforming activities found.

12.2 QUALITY RECORDS

The QCM shall follow established procedures for identification, collection, indexing, filing, storage, maintenance, and disposition of quality records.

Quality records are to be maintained to demonstrate achievement of the required quality and the effective operation of the quality system. Pertinent sub-contractor quality records shall be an element of this data.

All quality records shall be legible and identifiable to the project involved. Quality records shall be stored and maintained in such a way that they are readily retrievable in facilities that provide a suitable environment to minimize deterioration or damage to prevent loss of the records. Retention times of quality records shall be a minimum of seven (7) years, longer if required by specific project requirements. Where agreed contractually quality records shall be made available for evaluation by the client.

12.3 TRAINING

The QCM, the Project Managers and management are all responsible for identifying the training needs of all personnel performing activities affecting quality during production and installation. Personnel performing specific assigned tasks shall be qualified on the basis of appropriate education, training, and / or experience, as required. Appropriate records of training shall be maintained on each individual's training and qualifications.